

REMARKS

Reconsideration and further examination of this application is hereby requested. Claims 1-16 are currently pending in the application. Claims 1 and 13 have been amended. Claims 14-16 are newly added.

Attached hereto is a marked-up version of the changes made to the claims by the current amendment. The attached pages are captioned "VERSION WITH MARKINGS TO SHOW CHANGES MADE".

**A. The Interview**

Applicant thanks Examiner Glass and SPE Porta for the courtesy extended in the interview of October 22, 2002. A brief summary of the discussion during the interview follows.

The inventor, Dr. James Bremer, presented an explanation of the technology background from which his invention emerged. In particular, Dr. Bremer explained the problem of needing to image the Earth's surface from geosynchronous orbit with agility and without distorting the images taken by minimizing the amount of rotation of the image at the sensors.

Dr. Bremer conducted a demonstration, with the assistance of the undersigned counsel, using a laser pointer and a mirror. The laser pointer and mirror were used to demonstrate how the image orientation is affected by the particular mirror geometry used. The mirror geometry of prior art scanning systems was contrasted

with that according to the present invention. The demonstration showed how the present invention prevents the image orientation from rotating substantially with respect to the instantaneous direction of scan. This prevents image distortion at the sensors.

Concerning independent claims 1 and 13, the Examiner indicated that the addition of limitations concerning the specifics of the invention's geometry (i.e., the outer gimbal axis being perpendicular to the line of sight) may be favorable received. Such an amendment has been made, and the importance of this distinction is explained in detail, below.

Concerning independent claims 2 and 6, an agreement was reached that these claims define over the Messina reference because they each recite the "optically flat mirror disposed in the object space of the telescope" limitation. This distinction is explained in more detail, below.

**B. The Anticipation Rejection**

Claims 2-13 have been rejected under 35 U.S.C. § 102(b) as being anticipated by Messina (U.S.P. 5,672,866). This rejection is respectfully traversed based on the following arguments.

In order for a patent claim to be anticipated by the prior art, each and every limitation of that claim must be disclosed (explicitly or inherently) within a single prior art reference.

That is the law of anticipation. The Messina reference fails to meet this criterion concerning claims 2-13.

**B.1. Patentability of Claims 2-12**

Independent claims 2 and 6 each recites the limitation of an "optically flat mirror disposed in the object space of the telescope". In contrast, the mirror taught by Messina is not in object space -- it is in the image space with respect to the telescope. This is a meaningful distinction because it means that Messina cannot do what the claimed invention does -- scan the field of view across a field of regard. Messina scans within its telescope's field of view.

Accordingly, Applicant respectfully submits that the apparatus of Messina does not anticipate claims 2-12.

To counter any temptation to view this distinction as being obvious, it is noted that the placement of the mirror in the image space of the telescope is essential to the autocalibration system taught and claimed in Messina. Modification of Messina to have its scan mirror in object space would render the autocalibration system unworkable, which would not be an obvious modification since the calibration system is the whole point of the Messina disclosure.

**B.2. Patentability of Claim 13-16**

Claim 13 (as amended) recites that "the line of sight of the

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imager is perpendicular to the outer axis [of the gimbal]". Nowhere within the four corners of Messina is this feature taught, much less the conical arcs that result from scanning using such a geometry.

Accordingly, Applicant respectfully submits that the apparatus of Messina does not anticipate claim 13-16.

**C. The Obviousness Rejection**

Claim 1 has been rejected under 35 U.S.C. § 103(a) as being obvious over Messina alone. This rejection is respectfully traversed based on the following arguments.

In order for a patent claim to be obvious, each and every limitation must be taught or fairly suggested by the prior art. That is because the claim must be considered as a whole, not distilled down to a "gist."

Claim 1 (as amended) recites that "a line of sight of the imager is perpendicular to the outer axis [of the gimbal]". This limitation is not taught or fairly suggested by Messina. In the Messina disclosure the relationship of the outer gimbal axis to the line of sight of the imager is of such little importance that the outer gimbal axis is barely mentioned, and then only to indicate that it may compensate for motion of the imaging platform (an airplane). Certainly no thought is given in the Messina disclosure for how possible image rotation with respect

to a scan direction may affect clarity of the image being captured. Thus, no suggestion arises to orient the outer gimbal axis of the Messina imaging scheme so as to mitigate image rotation.

Accordingly, Applicant respectfully submits that the Messina reference does not support a *prima facie* case of obviousness with respect to claim 1 (as amended).

**D. Closing**

In view of the above, Applicant respectfully submits that independent claims 1, 2, 6, and 13 are patentable over the prior art of record. Applicant further submits that dependent claims 3-5, 7-12, and 14-16 are patentable, at least as being dependent from patentable independent claims, and are further patentable due to the additional limitations recited therein.

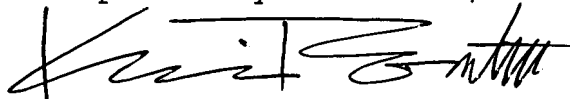
For the above reasons, Applicant respectfully submits that the application is in condition for allowance with claims 1-16. If there remain any issues that may be disposed of via a telephonic interview, the Examiner is kindly invited to contact the undersigned at the local exchange given below.

AMENDMENT UNDER 37 C.F.R. § 1.111  
Appln. No. 09/617,372

PATENT APPLICATION

The Director of the U.S. Patent and Trademark Office is authorized to charge any necessary fees, and conversely, deposit any credit balance, to Deposit Account No. 18-1579.

Respectfully submitted,



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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

Amend claims 1 and 13 as follows:

1. (Twice Amended) A method of scanning a field of view of an imager across a field of regard using a scan mirror mounted on a gimbal having an inner axis and an outer axis, the method comprising:

sweeping the field of view across the field of regard in a selected direction by rotating the gimbal about the inner axis while maintaining the gimbal at a fixed angle with respect to the outer axis;

progressing to a subsequent scan position by rotating the gimbal about the outer axis by a predetermined increment angle while maintaining the gimbal at a fixed angle with respect the inner axis;

repeating the act of sweeping such that the selected direction is chosen alternately from a first direction and a second direction that is opposed to the first direction; and

repeating the act of progressing prior to each repeated act of sweeping;

wherein [there is] a line of sight of the imager is perpendicular to the outer axis, so that there is substantially

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no rotation, with respect to the instantaneous direction of scan, of an image formed on the imager.

13. (Once Amended) An apparatus for imaging a two dimensional field of regard, the apparatus comprising:

an imager having a field of view along a line of sight, the field of view being substantially smaller than the field of regard;

a scan mirror disposed so as to cast the line of sight onto the field of regard, the scan mirror being mounted on a gimbal having an inner axis and an outer axis;

wherein the line of sight of the imager is perpendicular to the outer axis, so that the scan mirror causes the line of sight to be scanned across the field of regard in a conical arc when the scan mirror is rotated about the inner axis with no rotation about the outer axis.

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